PATENT
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Appln. No. 10/724,173

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Number	:	10/724,173	Confirmation No.:	9380
Applicant	:	Christian HAMON		
Filed	:	December 1, 2003		
Title	:	CATALYST BASED ON FERRIERITE/IRON FOR CATALYTIC REDUCTION OF NITROUS OXIDE CONTENT IN GASES, METHOD FOR OBTAINING SAME AND APPLICATION		
TC/Art Unit	:	1754		
Examiner:	:	Edward M. JOHNSON		
Docket No.	:	67493.000005		
Customer No.	:	**21967**		

MAIL STOP AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Declaration under 37 C.F.R. § 1.132

Sir:

I, Mr. Christian Hamon, do hereby state, that:

1. I reside at **41, chemin de Porcé – 44600 Saint-Nazaire - FRANCE**

2. I received a **degree of doctor in Inorganic Chemistry (1973) from Rennes I University and a Cinetic and Catalysis DEA degree in 1975 from ESCIL (Lyon – France).**

3. I am currently the head of the Regional Institute for Advanced Materials (IRMA), a position which I have held since 1990.

4. I have worked in the catalyst field for over 30 years.

5. Further details of my professional experience can be found on my resume, which is attached hereto as Appendix A.

6. I am the inventor of the subject matter of the above-captioned patent application, which relates to catalysts for conversion of N_2O and methods of using such catalysts. See, e.g., Specification, ¶ [002].

7. The claimed catalyst comprises ferrierite/iron assaying from 1 to 6% iron by weight in ion exchange position, with a potassium ion content in exchange position from 0.1-0.5% by weight. See claim 1 and Specification ¶¶ [011]-[013].

8. I have read and understand the specification of the above-captioned application ("specification") and claims of the above-captioned application ("claims"), as well as the references cited in the Office Action dated August 8, 2006 regarding the above-captioned application. Specifically, the references cited are: U.S. Patent No. 4,002,575 ("Ward"), and U.S. Patent No. 5,589,147 ("Farnos").

9. The cited references do not teach or suggest the catalysts that are claimed in the above-captioned patent application. Although Ward and Farnos disclose particular catalysts in their respective examples, none of the specifically disclosed catalysts in either Ward or Farnos are ferrierite/iron catalysts.

10. Aside from the catalysts disclosed in the examples, Ward and Farnos both recite lists of exemplary materials that can be used to make catalyst compositions. These lists are quite extensive. A person of ordinary skill in the art could potentially construct thousands of catalyst compositions from the lists of constituent materials and amount ranges listed in either Ward or Farnos.

11. The Office Action considered certain claims obvious based upon a theory that a person of ordinary skill in the art could select the components of the claimed catalysts from the lists disclosed in Ward or Farnos. As discussed below, this theory fails to account for iron and potassium being in ion exchange position. Putting that deficiency aside for a moment, the examiner's rationale suggests that each of the compositions that could be constructed from the list of components in Ward or Farnos would have identical properties--they would be catalysts for the particular purposes recited in Ward or Farnos. However, the test results in the specification demonstrate that the claimed catalyst compositions have unexpectedly higher catalytic performance for decomposing nitrous oxide under difficult catalytic conditions (high temperature, in the presence of water vapor and NOx) relative to many of the other catalysts that could potentially be constructed using the lists in either Ward or Farnos.

12. As shown in Example 4 of the specification, the claimed catalyst compositions show unexpected catalytic activity for selective conversion of N_2O in the presence of water vapor relative to four typical zeolite catalyst supports (Y, pentasil, beta, and mordenite). In particular, the Ferrierite based catalyst according to the claimed invention outperformed Y, pentasil, beta, and mordenite catalysts under conditions where water vapor is present (i.e., test conditions 3 and 4). Specification, ¶¶ [044]-[045]. Ward and Farnos lists, in addition to ferrierite, many other support materials including Y and mordenite. Neither Ward nor Farnos is directed to selective conversion of N_2O, and neither reference provides any guidance for selecting ferrierite relative to the other disclosed support materials.

A person of ordinary skill in the art would therefore have had no basis to expect that the enhanced selective conversion of N_2O could be attained by making catalysts using the materials listed in Ward and Farnos. Based on the foregoing, the claimed catalyst compositions exhibit unexpectedly superior catalytic activity that would have gone unappreciated by a person of ordinary skill in the art having no reference to the specification.

13. As shown in Example 5 of the specification, the claimed catalyst compositions show an unexpectedly higher activity for the conversion of N_2O in a gas mixture having a high N_2O concentration than the mordenite/iron combination, particularly at higher temperatures and in the presence of minor concentrations of NOx (NO). Specification, ¶¶ [048]-[049]. Neither Ward nor Farnos teach or suggest that the claimed catalyst compositions have higher activity for the conversion of N_2O in a gas mixture having a high N_2O concentration. Thus, the claimed catalyst compositions have unexpected properties which a person with ordinary skill in the art would not recognize in view of either Ward or Farnos.

14. As shown in Example 6 of the specification, the claimed catalyst compositions demonstrate higher hydrothermal stability than the mordenite/iron catalyst at high temperature and in the presence of water vapor. Specification, ¶¶ [050]-[053]. The cited references do not teach or suggest that the claimed catalyst compositions have higher hydrothermal stability. Thus, the specific catalyst compositions claimed have unexpected catalytic activity which a person with ordinary skill in the art would not recognize in view of either Ward or Farnos.

15. Finally, even if a person of ordinary skill in the art selected ferrierite, iron, and potassium to make a catalyst, such a catalyst would not necessarily meet the claim limitations. This is because the iron and potassium in the claimed catalyst position must be in ion exchange position, which is not necessarily the case when the three components are simply blended together.

16. Based on the foregoing discussion, the examples in the specification individually and collectively demonstrate that the claimed catalysts have unexpectedly superior properties for selective reduction of N_2O relative to the large number of compounds that could possibly be constructed using the lists of catalyst components disclosed in Ward or Farnos.

17. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and imprisonment, or both, under 18 U.S.C. §1001, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed ______________________

Christian Hamon

Place Ploemeur, France

Date November 6th, 2006

Christian HAMON

RESUME

Appendix A

Type of degree : PHD in Inorganic Chemistry (1973) from Rennes I University (France) and a Cinetic and Catalysis DEA degree in 1975 from ESCIL Lyon (France).

Professional resume :

- R & D engineer at Grande Paroisse SA (1975)
- Responsible of the R&D department at Grande Paroisse SA (1985)
- IRMA manager since 1990

References - Experience :

- Holder of about 15 patents.

- At IRMA :

  . Pig manure processing : development of the SMELOX process (IFP licence) in partnership with IFP.

  . Organic waste thermolysis process : pilot experimentations with an indirect heating rotary furnace for IFP.

  . N_2O catalytic decomposition (greenhouse gas) : patents and one industrial reference (collaboration with Grande Paroisse SA)

  . NOx catalytic reduction by NH_3 : 4 industrial references.

  . VOCs catalytic oxidation : technologies development – one industrial reference.

- At Grande Paroisse (main references) :

  . Methanol transformation in light olefins (C_2-C_3) : relative patent transferred to IFP.

  . NOx catalytic reduction process by NH_3 applied to nitric acid tail gas : several patents (catalysts + process). More than 20 industrial references.

  . Responsible of ZEOCAT Company establishment (subsidiary company of Grande Paroisse SA and IFP) : modified zeolites as the base of refinery industry catalysts.

Experience about hydrogen production

- R&D engineer at Grande Paroisse SA. Hydrogen production for NH_3 synthesis. Expertise on the different catalytic steps : calculation, simulation, process optimisation : desulphurization, steam reforming, oxygen cracking (ATR), high and low temperature shift.

  New catalysts development. Pilot scale development on real gases.

  Catalyst industrial manufacturing : "Craking", "Shift" and Ammonia synthesis.

- 2000 : expertise in California - USA (Long Beach) on an hydrogen production unit (about 100 kW power) including some disfunctioning.

  Objective of this unit : pure H_2 (PSA at the end). Then compression and utilization (bottles) for PEM applied to bus.

  This expertise has been required by a French industrial concerned by this unit. It has been realized in partnership with Paul Gateau (Loire 2IS). We have developed at IRMA a pilot unit for studying a catalytic stage (15 bar, 200 cm^3 of catalyst). This study allowed us to give them a reliable explanation.

- Development of a natural gas catalytic reformer for hydrogen production and coupling with a PEM fuel cell. Works realized from 2003 to 2006 in partnership with HELION and GAZ DE FRANCE. Results presentation at the WHEC at Lyon in June 2006.